

TACSM Abstract

Voluntary Wheel Running during Weight Loss Leads to Differential Changes in Monocytes, Compared to Forced Treadmill Running

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ABSTRACT

High-fat feeding and subsequent weight gain may contribute to innate immune dysfunction. Weight loss via calorie restriction and exercise represent one means to restore normal immune function. The purpose of the study was to examine how 8- weeks of aerobic exercise and low-fat diet affects weight gain, monocyte concentration, and monocyte cell-surface expression of TLR2, TLR4, CD80, and CD86. For 12-months, 24 male CD-1 mice underwent a pre-treatment phase, consuming either a low fat (10% fat) or high-fat (60% fat) diet *ad libitum*. Mice were randomly assigned to one of four groups (N=6/group): CN (low-fat sedentary), V-EX (voluntary wheel running), F10 EX (forced treadmill running), or SD (sedentary). V-EX, F-EX, and SD groups were switched from the high-fat to low-fat diet for an 8-week treatment period, while the CN group continued consuming the low-fat diet. Saphenous vein blood samples were analyzed using flow cytometry at baseline, week 4, and week 8. V-EX (36.4%) and F14 EX (27.1%) lost significant body weight over 8-weeks ($P<0.001$). V-EX ran 4.4x more than F-EX ($P<0.001$). As a group, V-EX had higher monocyte concentration than CN (48.9%) and F-EX (58.9%, $P=0.004$). Cell-surface expression of TLR2 (22.9%, $P=0.002$), TLR4 (33.3%, $P<0.001$), and CD86 (18.6%, $P<0.001$) increased from baseline to week 8. A time effect was seen in week 4 when CD80 expression was 42% greater for V-EX than SD ($P=0.013$). The present study confirms short-term exercise and low-fat diet consumption cause significant weight loss and altered immune profile as measured by increased TLR2, TLR4, CD80, and CD86 expression.